I claim:

1. An apparatus for pulverizing a feed material, comprising:

(a) an inlet section configured to control the rate of flow of the feed material into the apparatus;

(b) a source of liquefied inert gas connected to the inlet section such that the material traveling through the inlet section is exposed to the inert gas as it evaporates, causing the material to be cooled; and

(c) a crusher connected downstream of the inlet section, the crusher configured to mechanically pulverize the material into a smaller size.

2. An apparatus for pulverizing a feed material, comprising:

(a) an inlet section configured to control the rate of flow of the feed material into the apparatus;

(b) a source of liquefied inert gas connected to the inlet section such that the material traveling through the inlet section is exposed to the inert gas as it evaporates, causing the feed material to be cooled and facilitating mechanical pulverization of the feed material;

(c) a crusher connected to the inlet section, the crusher having a rotating part and a lining part configured such that the rotating part impacts the material during operation of the device and accelerates the material towards the lining part, the operation thereof pulverizing the material into a smaller size; and

(d) an outlet section connected to the crusher configured to control the rate of flow of the material exiting the device.

3. The apparatus of claim 1, wherein the crusher is comprised of a surface which is harder than the feed material.

4. The apparatus of claim 1, wherein the crusher is a flywheel turbine.

5. The apparatus of claim 2, wherein the inlet section is inclined to about 30° from horizontal.

6. The apparatus of claim 2, wherein the liquefied inert gas is at least one of carbon dioxide and nitrogen.

7. The apparatus of claim 2, wherein the feed material is cooled to at least -100°C prior to passing into the crusher.

8. The apparatus of claim 1, wherein the feed material is selected from the group consisting of precious metal ores, semi-precious metal ores, coal, coal derivatives, cement and refractory materials.

9. The apparatus of claim 2, wherein the rate of flow of the feed material is controlled by the inclination and effective cross-sectional area of the inlet section.

10. The apparatus of claim 2, further including at least one nozzle in fluid connection with the inlet section and the source of liquefied inert gas.

11. The apparatus of claim 10, wherein there are two nozzles directed radially into the inlet section, each nozzle fixed 15° from vertical when viewed in cross-section.

12. The apparatus of claim 2, wherein the outlet section includes a mesh screen that limits the size of the feed material exiting the crusher.

13. A method for pulverizing a feed material comprising:

(a) evaporating a liquefied inert gas in the presence of a feed material so that the feed material is cooled and becomes more susceptible to mechanical pulverization; and

(b) pulverizing the cooled material.

14. The method of claim 13, further comprising passing the feed material through an inlet section of a crusher and injecting a liquefied inert gas through at least one nozzle into the inlet section of the crusher.

15. The method of claim 13, including the additional step of passing the pulverized feed material through a -200 micron screen after step (b).

16. The method of claim 13, wherein the feed material is pre-crushed, for example, in a ball mill, prior to step (a).

17. The method of claim 13, wherein the feed material is cooled to at least -100°C prior to the pulverization step.

18. The method of claim 13, wherein the liquefied inert gas is at least one of carbon dioxide and nitrogen.

19. The method of claim 13, wherein the feed material is pulverized by a crusher selected from the group consisting of a gravity impactor, a flywheel turbine and a rotary hammermill.